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Gaining Leverage Over Vendor Lock to Improve
Acquisition Performance and Cost Efficiencies

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14. ABSTRACT During the acquisition life cycle of a product, technology, or service, the Federal Government often finds itself dependent upon a single vendor to satisfy requirements. Once the Government enters into this long-term business relationship, there may be little leverage to control costs and manage performance. This research paper first describes vendor lock and its implications. The paper covers recent Department of Defense acquisition guidance and a change to the U.S. Federal Statute relative to intellectual property that could impact how a System Program Office deals with single-source vendors. The paper then explores specific steps that the Government can take now to avoid entering into vendor lock situations, as well as additional steps to mitigate the impact of a vendor-locked environment during contract performance. Finally, this paper suggests forms of continuous competition that could protect programs from vendor lock by maintaining the pressure of competition throughout the system life cycle.					
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Panel 6. The Role of Competition in Contracting

Wednesday, May 14, 2014	
1:45 p.m. – 3:15 p.m.	<p>Chair: Elliott Branch, Deputy Assistant Secretary of the Navy (Acquisition and Procurement)</p> <p><i>Gaining Leverage Over Vendor Lock to Improve Acquisition Performance and Cost Efficiencies</i> Virginia Wydler, MITRE Corporation</p> <p><i>Open Systems Architecture License Rights: A New Era for the Public–Private Market-Place</i> Nickolas Guertin, DASN RDT&E Howard Reichel, In-Depth Engineering Corporation</p> <p><i>Strategies for Competition Beyond Open Architecture (OA): Acquisition at the Edge of Chaos</i> Niraj Srivastava, Raytheon Michael Rice, R2E, Inc.</p>



Gaining Leverage Over Vendor Lock to Improve Acquisition Performance and Cost Efficiencies

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Abstract

During the acquisition life cycle of a product, technology, or service, the Federal Government often finds itself dependent upon a single vendor to satisfy requirements. Once the Government enters into this long-term business relationship, there may be little leverage to control costs and manage performance. This research paper first describes vendor lock and its implications. The paper covers recent Department of Defense acquisition guidance and a change to the U.S. Federal Statute relative to intellectual property that could impact how a System Program Office deals with single-source vendors. The paper then explores specific steps that the Government can take now to avoid entering into vendor lock situations, as well as additional steps to mitigate the impact of a vendor-locked environment during contract performance. Finally, this paper suggests forms of continuous competition that could protect programs from vendor lock by maintaining the pressure of competition throughout the system life cycle.

Introduction

The defense acquisition life cycle contains multiple opportunities to utilize a broad base of companies to deliver products and services. Early in the acquisition process, requirements development can include many companies, large and small, which can bring new technology to the table. As the design evolves, the vendor base is narrowed through a down-select process. Dual sources in development are commonplace, and actually mandated in acquisition regulations. However, once production begins, the Government acquisition experts generally will pick one winner to deliver a product over a lengthy operations and sustainment period. This can cause one vendor to become the single provider of a product, system, or technology.

When a vendor wins the production competition award, that vendor becomes the single defense contractor delivering those products to the U.S. military customer. If the product is utilized by multiple military services, the vendor can become the single provider of a family of products or technology through subsequent competitions across a broad customer base. This represents billions of dollars in defense business across the three services going to a single vendor for very similar systems in the military technology. This research paper explores the steps that U.S. military program managers and acquisition officials could take to gain leverage in a potential vendor lock situation involving a single vendor. This paper does not address or question a vendor's performance on these contracts, but instead centers on the problems that could result from the degree of leverage exerted on the Government by a single company.



Vendor Lock

The term *vendor lock* describes the situation in which customers depend on a single manufacturer or supplier for some product (i.e., a good or service), and cannot shift to another vendor without incurring substantial costs or inconvenience. This can grant the vendor what amounts to monopoly power and thus creates the opportunity for the vendor to earn far greater profits than it could in the absence of such dependence.¹ Vendor lock frees vendors to establish noncompetitive prices since they have become the “sole source” of a given product or service.

Admittedly, some of the downside of vendor lock may be offset by savings resulting from (1) shorter learning curves, (2) development costs absorbed by the vendor because of the advantage of controlling a large business base, and (3) investment costs for commercial technologies and derivative product lines that can benefit military products. However, those savings can be minor compared to the typical cost growth associated with single-source acquisition programs. A GAO report revealed that the average major defense weapons system experienced a 38% cost growth from original estimates and a 27-month schedule overrun.²

Vendor lock often has two main drivers: lack of Government ownership of assets (technical data and intellectual property), and lack of continuous competition during production. A recent survey of 340 defense leaders identified problems associated with a broken acquisition process; this survey showed 39% of the respondents identified lack of Government ownership of key assets, and 30% of respondents identified vendor lock-in or sole source as problems that drive acquisition problems.³

Proprietary intellectual property (IP) rights restrictions may result from technical data and standards controlled by the vendor. Recently, the Government made significant changes to U.S. Federal Statute relative to IP rights: The Government may now challenge restrictions placed on the IP by the vendor.⁴ Previously, vendors simply declared ownership, forcing the Government to disprove the allegations. This change in the law may be vital to breaking or mitigating vendor lock in the future.⁵ The Air Force released their sixth edition of the *Technical Data and Computer Software Rights Handbook for Acquisition Professionals*, March 2014, where they emphasized the value of owning technical data rights:

Specifically, if Program Office personnel do not acquire sufficient rights in technical data and computer software prior to award, they may relinquish the opportunity to enhance competition and preserve core logistics capabilities as required by 10 U.S.C. §§ 2464 and 2466. If the Government relinquishes that

¹ Office of the Secretary of Defense Open Systems Architecture Contract Guidebook for Program Managers, Version 1.1. May 2013. Appendix 10, Breaking Vendor Lock. Washington, DC; p. 167.

² GAO. March 2012, Report GAO 12-400SP, Defense Acquisitions Assessment of Selected Weapon Programs, Washington, DC; p. 8.

³ Government Business Council and Booz Allen Hamilton, *Bridging the Disconnect*, Insight Report, March 2014, Government Executive Media Group, Washington, DC, p. 1.

⁴ Taft News and Events; DoD Issues Final Rule on Ownership of Technical Data Rights Where Commercial Item is Developed Exclusively at Private Expense, retrieved from <http://www.taftlaw.com/news/publications/detail/872-dod-issues-final-rule-on-ownership-of-technical-data-rights-where-commercial-item-is-developed-exclusively-at-private-expense>, Oct 18, 2011, p. 1.

⁵ GAO. May 2011, Report GAO 11-469, Defense Acquisition: DoD Should Clarify Requirements for Assessing and documenting Technical-Data Needs, Washington, DC; p. 1.



opportunity prior to award, the Program Office will lock itself into a position where the incumbent can force it to pay an exorbitant price years or decades hence to be able to use, release or disclose that technical data or computer software to individuals outside the Government. Of course, that assumes the incumbent is willing to sell the Program Office a license to use, release or disclose that technical data or computer software to individuals other than Government employees at any price.⁶

The value of competition has been incorporated into every major piece of federal legislation on acquisition reform and is continually touted in political speeches and public engagements. The Department of Defense (DoD) strives to foster competition; however, like many Government agencies, the DoD tends to view competition as an activity that occurs only during the initial contracting process, rather than as a dynamic tool for achieving success over the life of a program. Most military service programs today award development and production contracts to a single prime vendor or contractor team. Using this single-provider approach, the program fails to maintain continuous lifecycle competition—the use of competition to motivate contractor performance throughout the life of a program. As a result, too many acquisition programs fail to achieve their cost, schedule, and performance objectives.

Avoiding vendor lock or minimizing its effects is consistent with ensuring affordability in military systems, as directed by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]) memorandum of September 14, 2010, Better Buying Power (BBP). There are several considerations that can drive affordability and mitigate or control the impact of vendor lock. This paper addresses several actions that can be taken by the military services and their program offices, with specific emphasis on owning IP and continually introducing competition into the process.

Benefits of Competition

Competition is an extremely strong motivator: The forces of competition act as an “invisible hand” to self-regulate contractor performance. Contractors tend to keep each other in check, and the Government greatly benefits from, and is protected by, the nature of competition. Extensive historic data on military programs has shown that costs consistently decline in a competitive environment, while performance and reliability increase. A 2001 study by the RAND⁷ Corporation showed that the introduction of a second source during the production of the Tomahawk missile led to estimated savings of \$630 million, while improving the missile’s reliability from approximately 80% to 97%.

By contrast, a single-provider environment produces smaller performance improvements, longer schedules, and higher costs. The same RAND study also revealed that the 10 DoD aircraft programs that involved no competition during the production phase experienced an average 46% increase in cost over the original budget. Schedule delays and cost overruns consume significant resources; for example, a 2011 study by the Center for

⁶ Acquiring and Enforcing the Government's Rights in Technical Data and Computer Software Under Department of Defense Contracts: A Practical Handbook for Acquisition Professions, March 2014; Office of the Staff Judge Advocate, Space and Missile Systems Center; p. 2.

⁷ RAND Corporation. 2001. *Assessing Competitive Strategies for the Joint Strike Fighter—Opportunities and Options*. Santa Monica, CA; p. 16.



Strategic and International Studies (CSIS)⁸ found that 32% of the single-award contracts let after full and open competition with multiple vendors experienced overruns, at a net cost to the Government of \$19 billion over the life of the program. Since programs experience fewer overruns and delays in a continuous competition environment, the DoD can invest less time and money overall in managing its programs.

Avoiding and breaking vendor lock can be accomplished by creating an environment of continuous competition in both development and production. This paper addresses several techniques to keep a second or third vendor in the game by offering shared contract dollars to pursue alternative technologies and shared contract quantities to maintain a production capability at low levels. As a result, the single vendor does not have a lock on the business or technology.

Options for Avoiding Vendor Lock

The following items should be considered early in the acquisition process, generally prior to contract award for production, to offer maximum influence over vendor lock during the acquisition life cycle.

Examine Intellectual Property and Technical Data Rights—IP ownership can drive costs up because the owner naturally wants to recoup investment costs through sales of its products. Thus, vendors have motivation to declare IP ownership. To overcome this issue, the U. S. military must fully leverage all license rights for IP to which it is already entitled. Both the development and production contracts can consider three items vital to the Government position to avoid vendor lock: technical data procurement, leveraging software reuse, and maximum use of open source software. The Government should assess all proprietary aspects of the proposed technical and engineering solution and negotiate optimum data rights. The *Office of the Secretary of Defense Open Systems Architecture Contract Guidebook for Program Managers*, Version 1.1, Appendix 10, Breaking Vendor Lock⁹ (herein after referred to as the OSD OSA Guidebook) contains several approaches to breaking vendor lock. This paper explores several approaches in this section and suggests specific activities for the Program Office.

- *Conduct an audit of IP and proprietary IP claims.* The program Office should challenge restrictions placed on IP by the vendor in its contract and in any production change proposals. Vendors develop IP both under Federal contracts and at their own expense. The lines can become blurred, especially if individual customers (such as the various military buyers) impose unique requirements. This is especially true with the emergence of Open Systems Software (OSA) and data rights addressed early in the life cycle. Software-intensive systems share the common problem where vendors use recycled code to streamline the software production process. Sometimes vendors incorporate open source code in their systems and then claim restricted/limited rights over the resulting IP. In these cases, the Government

⁸ Hofbauer, Joachim et. al. 2011. *Cost and Time Overruns for Major Defense Acquisition Programs*. Center for Strategic and International Studies, Washington, DC. Meyers, Dominique. 2002. *Acquisition Reform: Inside the Silver Bullet—A comparative analysis—JDAM vs. F-22*. *Acquisition Review Quarterly*; p. 1.

⁹ Office of the Secretary of Defense Open Systems Architecture Contract Guidebook for Program Managers, Version 1.1. May 2013. Appendix 10, Breaking Vendor Lock, Washington, DC; pgs. 167–176.



may employ various software code scanning tools to assess limited/restricted rights over IP that it did not actually possess.

The Program Office should communicate with the other military services doing business with their prime vendor on similar systems to verify and validate which IP the Government has already acquired under development and/or production contracts and determine the total extent of Federal Government IP.

The Program Office should consider using software tools, such as the Open Source Software Scanner (OSSS),¹⁰ to determine if the software includes open source code that may provide the Government with additional IP rights at no additional cost. Such an activity could be a precursor to a broader discussion regarding the source of all software code and associated claims of IP license rights, and could support a decision to audit the current state of a program's IP license rights.

The Program Office should include provisions in the contract that require the vendor to provide a detailed approach on use of open source software and associated cost efficiencies. The Program Office should use this information in analyzing the vendor proposal incorporated into the final contract award to determine inconsistencies or redundancy in IP between the proposed solutions.

- *Assess what the Government has and may need in the future.* The Government typically has more IP rights than it realizes because an issue may not have been fully explored during the contract negotiation process. The Program Office should assess its current IP license rights versus rights it might need to ensure the prospect of future competition for the product or technology. If they obtain full Government Purpose Rights (GPR) for key pieces of IP in the system, it can initiate separate competition among other vendors for those subsystems or components. As noted earlier in this report, a recent change in the law now makes the contractor responsible for defending assertions of limited/restricted data rights for commercial items developed completely at private expense.

The Program Office should seek advice from legal counsel about implementation and application of this new legislation.

The Program Office needs to analyze GPR on past and current product contracts, utilizing Defense Contract Management Agency (DCMA) records for other U.S. military contracts with similar GPR provisions where available.

- *Plan to transition proprietary interfaces to current industry standard interfaces.* Proprietary interfaces present an additional issue that may contribute to vendor lock. The Naval Air Systems Command (NAVAIR) has

¹⁰ Linux Foundation; open source tools, [retrieved from http://www.openlogic.com/products/scanners/](http://www.openlogic.com/products/scanners/); <http://www.linuxfoundation.org/programs/legal/compliance/tools>. San Francisco, CA, p. 1.



developed a tool, the Key Open Subsystems Tool (KOSS),¹¹ to evaluate which system components may be most susceptible to vendor lock because of proprietary interfaces. This tool offers one method for determining the most important subsystems/components for which the Program Office should seek license rights. The KOSS Tool can identify those important system components that may become obsolete or require upgrades more often than others. This tool can help a program to evaluate which key system components may prove most susceptible to the negative impacts of a vendor-locked situation. In short, if only one vendor can replace or upgrade those key components, that de facto monopolist may be able to exert excess negotiating leverage over replacement/upgrade prices. The KOSS tool may help the Government to identify any key component interfaces that use proprietary standards and should be modified to use open standards, thus allowing other qualified vendors to provide replacement components. By highlighting these key components, KOSS allows a program to focus its efforts on acquiring IP rights only for those highly volatile areas of the system and to conserve resources by disregarding IP for other, less important system components.

The Program Office should consider using the KOSS tool or generating a similar tool to determine which interfaces on the system may be most susceptible to vendor lock in the years to come. The Program Office should discuss lessons learned with NAVAIR regarding the benefit and utility of the KOSS tool.

The Program Office could perform an IP Business Case Analysis, as prescribed in Better Buying Power initiatives, utilizing discoveries from the KOSS tool analysis.

- *Review documentation under Contract Data Requirements List (CDRL) items.* Defense contracts include the Data Accession List (DAL) provision under DFARS Clause 52-227-10, which allows the Program Office to determine the data it would like to access and at what cost. For example, the Government is always entitled to unlimited rights in Form, Fit, and Function data for a given system regardless of who funded system development. However, many times that information is never requested by the Government. It is vitally important that the Program Office consider a review of non-delivered CDRLs and assert IP rights in the product or technology as noted in the OSD OA Contract Guidebook.¹²

The Program Office should use the DAL to require vendors to identify and propose cost efficiencies in technical data as a result of technology advances.

¹¹ Key Open Subsystems Tool, Naval Air systems Command, Patuxent River, MD; Public Release SPR-09-674, 5 Aug 2009; retrieved from https://acc.dau.mil/adl/en-US/317012/file/46502/KOSS%20Overview_FINAL_5Aug09.pdf; p. 1.

¹² Office of the Secretary of Defense Open Systems Architecture Contract Guidebook for Program Managers, Version 1.1. May 2013. Appendix 10, Breaking Vendor Lock. Washington, DC; p. 171.



The Program Office should look for opportunities to discover redundant data delivery or areas where specifications could be revised to allow delivery of more common data items. The Program Office should engage the vendors and the product supply chain vendors to determine opportunities for savings in data delivery.

Apply Continuous Competition Strategies—The Federal Acquisition Regulation (FAR) recognizes several competitive acquisition methods. Awards can be made to a single winner, or awards can be made to multiple sources, thereby influencing the presence of competition for the remainder of the life cycle. Dual sourcing and leader-follower are two established acquisition methods used to implement continuous competition throughout the life cycle. The Defense Federal Acquisition Regulation Supplement (DFARS) Subpart 207.1 recognizes dual sourcing as a viable approach to acquisition. This method creates competitive pressure through having two or more sources deliver systems that meet requirements. Dual sourcing has been used primarily by programs with reasonable start-up costs that produce large quantities of an item at the least total cost. Under leader-follower sourcing, described in FAR subpart 17.4, an otherwise sole-source “leader” contractor provides “assistance and know-how” to a “follower” contractor to achieve the benefits of multi-sourcing.

- *Consider dual sourcing strategies to introduce continuous competition into the acquisition process.* Continuous competition strategies and methods can be applied from development through production in order to maintain multiple sources throughout the acquisition life cycle. These strategies can include dual sourcing in production, leader-follower contracts, low-level production quantities, and targeted technologies development with a second vendor.

Competitive Dual Sources. The Government fully funds two contractors to execute their designs or solutions to meet a need. The contractors fully develop and produce their designs, thus providing the Government with two viable solutions. The two sources continuously drive down prices while also improving the performance and reliability of their products over time. Of the continuous competition strategies, this approach requires the greatest upfront investment by the Government, but it also creates the most competition and the highest probability of meeting program mission needs on schedule.

- *Consider competitive multi-sourcing.* Under this approach, programs would select more than one contractor to develop, produce, and sustain a program throughout its life cycle: a primary source and one or more secondary sources that contribute a lower level of design development and work share. A second contractor is selected to create a continuous competitive environment and to provide a viable back-up should the primary contractor fail to meet program objectives. Under this model, the Government awards the majority of funding to a prime contractor, and at the same time provides a smaller amount of funding to a secondary source. Keeping a second source under contract at even a low level (e.g., 5–10% of prime contract costs) maintains significant competitive pressure on the prime contractor by greatly reducing the barriers of entry into the program (i.e., it lowers the costs of switching if the prime does not perform satisfactorily). It also allows the second source to refine and mature its technical approach and gain familiarity with the program’s operations. The cost of implementing this competitive multi-sourcing approach can be relatively small compared to the benefits of



competition that it provides. The Program Office can apply this approach in several ways to maintain continuous competition in all stages of the acquisition lifecycle:

Percentage-Based Distributions. Under this strategy, a set percentage of funding is allocated to each source. For example, Vendor A submits the best offer and receives the majority of funding (e.g., 90%) as the primary source. Vendor B submits the second-best offer and receives a smaller percentage of funding (e.g., 10%) to partially develop its design or to work on a particular subset of the contract requirements. This strategy keeps a second viable source in play during the prototyping, development, production, and sustainment phases, which will provide competitive pressure to motivate the primary contractor.

Full Development With Scaled Production. Under this strategy, two or more contractors are fully funded to develop prototype products. After the two prototypes have been delivered, the Government selects one contractor for full-scale production and awards a contract for limited production to the second source. This strategy can work best for products to minimize risk during the design phase of the program.

Next Increment Prototype Model. Under this strategy, the Program Office uses a primary source to maintain engineering capability for the current production unit. A lesser amount of funding is provided to a secondary source to build a prototype for the next program increment. In addition to getting a head start on the next spiral of development, this mechanism allows the Program Office to introduce a second capable source and position it to compete with the prime for the next program increment.

Partial Contractor-Funded Development Model. Under this strategy, the Program Office caps the amount of development funding to a second contractor (e.g., 30% of proposed costs). The contractor has the option to fully fund the development of the proposed design. This gives the contractor the potential to recapture these development costs during the production phase if the Government selects the second contractor's design for production.

Explore Shared Military and Commercial Technology—The Government should not rely on the vendors claim that technology only has a military application; an independent Government analysis should be conducted to determine potential areas of both military and private investment relative to product technology. The DCMA and Defense Contract Audit Agency (DCAA) both have information on the vendor's total federal contract business base for product technology, including any independent research and development (IR&D) applied to the corporation's commercial work.

- *Examine investments in technology across vendor product lines.* Many programs are aligned with vertical integration points to ensure the system operates efficiently. However, looking at horizontal system-of-system integration points across multiple production lines for products may reveal cost savings and areas that could justify revision to the specifications to take advantage of common technology advances.

The Program Office should continually pursue vendors to identify specific opportunities for cost sharing, such as software reuse and horizontal interfaces.



The Program Office should request an independent review by DCMA and DCAA, separate from the normal product proposal audit, to identify areas of cost efficiency based on an understanding of vendor investments in technology across product lines.

Plan for Alternative Production Quantities—Many times economic ordering quantity assumptions will lead the Government to purchase more capabilities than needed. The cost of a product increases as production slows, based on assumed fixed cost allocations across a smaller business base. There may be a tendency to buy more production units than needed in order to keep the unit cost down and production lines open. But in the larger picture, this leads to higher overall costs. The more compelling argument for higher production pace is to reduce risk of lost expertise and industrial base capability. This additional risk is usually assumed but never quantified through vendor proposals and the independently verified.

- *Review production quantity assumptions.* To avoid unverified assumptions and unjustified risk, pricing for quantity variables should be included in the solicitation for production, and then evaluated for the risks and benefits of various buying scenarios using real pricing from the vendor.

The Program Office should structure the contract line items to accommodate multiple production paces in order to verify the costs and impact of slower or accelerated production rates.

The Program Office should request that DCAA scrutinize the price differences of various quantity options to allow the Program Office to weigh the costs against risk reduction.

The Program Office should conduct an independent study about assumptions around production rates and impact to the industrial base for their military systems or technologies. The Program Office may use assumption analysis in the AT&L PARCA Report, *Performance of the Defense Acquisition System 2013 Annual Report*,¹³ which addresses the impact of framing assumptions on baseline costs.

The Program Office should look across multiple production lines for other military service requirements for examples of production paces and economic ordering quantity strategies.

Evaluate Test and Evaluation Strategies—Testing and design problems can be major cost drivers for any large system. The DoD has canceled entire programs for cost overruns under the Nunn-McCurdy Amendment after investing billions of dollars. According to the Government Accountability Office (GAO), 50 of 74 breaches involved engineering design issues discovered after production had begun.¹⁴ By law, AT&L Office of Performance Assessments and Root Cause Analyses (PARCA) must perform a statutory root-cause analysis for all “critical” Nunn-McCurdy breaches as well as discretionary root-cause

¹³ Performance of the Defense Acquisition System, 2013 Annual Report, Washington, DC: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, 201; p. 10.

¹⁴ GAO. 2011. *Trends in Nunn-McCurdy cost breaches for major defense acquisition programs* (Report No. GAO 11-295R). Washington, DC; p. 1.



analyses requested by the Secretary of Defense (see 10 U.S.C., Section 2438).¹⁵ These breaches focus on work content changes (changes to technical requirements, testing, and system interoperability requirements). The Navy has shown a distinct advantage in the aircraft area to control costs, since they control the work content changes. The Navy has also adopted a process improvement approach to the production test for the Navy Multiband Terminal (NMT) going through test in 2012. The Program Office may want to consider the lessons learned from NMT as they execute the production contract.

- *Adopt a broad test strategy.* There are several opportunities to adopt a better test and evaluation strategy and apply these strategies early in the development phase and continue the strategy throughout the production process:

Family of Products—Interoperability standards need to be established for broad system or total technology acquisitions. Require the vendor to develop alternative material solutions, and then have another vendor validate the standards.

Cloud and Virtualization—Run applications as a service, moving away from the vendor and a stovepipe environment for multiple products for different systems. Adopting common systems early in the process will help manage upgrades after production has started, and minimize schedule impact.

Early Involvement by Test and Evaluation (T&E) Experts—Create an evaluation framework early in the system development, prove the design and sustainment concepts early through demonstration and test, apply challenge-based acquisition methods. The DoT&E Annual Report of 2013 recommends early involvement.

Develop a Common Test Environment—so that the system can be proven to be end-user suitable as well as supportable. Cyber upgrades and software fixes need to be easily accommodated using a common test environment strategy.

IP Rights Need To Be Established for Test Data—not just for unlimited rights in technical production data and computer software. IP rights should extend to the development and test environment where vendors may lay the groundwork for system changes.

Minimizing the Effects of Vendor Lock

Several actions can be taken during the production phase of the acquisition life cycle in order to minimize the effect of vendor lock for the remainder of the production delivery.

Adopt a Common Architecture Approach—While products may have been under development for some time, the Program Office can still take certain actions to minimize the impact of vendor-lock. These activities include the following:

¹⁵ Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, 2013. Performance of the Defense Acquisition System, 2013 Annual Report, Washington, DC; p. 36.



- *Develop a common architecture across a product line.* If the Program Office already finds itself tied to a single vendor for the product or technology within a system or program, it could foster development of a common architecture via a comprehensive migration approach. This strategy for migration to a common architecture may include a single military service range of systems or could constitute a Joint approach with other military counterparts that have contracted with the vendor to develop similar systems.

The Program Office should develop a mitigation strategy that addresses how an effort may be structured to support commonality across a line of products with several different customers, and consider the OSD OA Contract Guidebook¹⁶ as part of this migration strategy,

The Program Office should focus on legacy programs, paying particular attention to “back-fit” and “forward fit” of systems.¹⁷

- *Negotiate priced line items for technical data and open systems architecture under the existing contract under a sole source Justification and Authorization (J&A).* The Air Force’s Technical Data and Computer Software Rights Handbook recommends that the Program office anticipate buying technical data and rights after the contract is awarded under a sole source environment.¹⁸ The Program Office should take steps during the contract period of performance to identify, reverse engineer, or acquire technical data or computer software that could support open systems architecture under the J&A.

The Program Office should plan to negotiate additional technical data and computer software when markings can be removed to allow full use under the current production contract and any planned follow-on competitions.

The Program Office should take advantage of Open Business Model (i.e., Open System Architecture) practices to minimize future sole source situations.

Explore Commonality Across Product Lines—The military services can often drive costs because they demand unique Key Performance Parameters (KPPs), which drives non-standardization. Collaboration across the other military services to develop common performance requirements may result in a decrease in the cost of the product or technology.

- *Review specifications for commonality.* The Program Office should develop a plan for encouraging more standardization of components and parts across the production line, utilizing DCMA as a focal point for data analysis. The plan should include better visibility into prime vendor usage of single-source

¹⁶ Office of the Secretary of Defense Open Systems Architecture Contract Guidebook for Program Managers, Version 1.1. May 2013. Appendix 10, Breaking Vendor Lock. Washington, DC; p. 173.

¹⁷ Office of the Secretary of Defense Open Systems Architecture Contract Guidebook for Program Managers, Version 1.1. May 2013. Appendix 10, Breaking Vendor Lock. Washington, DC; p. 173.

¹⁸ Acquiring and Enforcing the Government’s Rights in Technical Data and Computer Software Under Department of Defense Contracts: A Practical Handbook for Acquisition Professions, March 2014; Office of the Staff Judge Advocate, Space and Missile Systems Center; p. 48.



suppliers and an ability to modify requirements so that standard commercial parts can be substituted for single-source parts.

The Program Office should consider reaching out to its military service counterparts to determine if any duplication of efforts might be occurring across the other Services' like systems because of non-standard requirements.

The Program Office should pursue reduced operating and maintenance (O&M) costs by asking the prime vendor to provide supplier efficiency proposals.

- *Look for production efficiencies.* DCMA is a resource that could be utilized more by the services to provide information about production and quality. DCMA, through their Engineering and Analysis Division, could provide broad technology analysis across production lines of a single vendor under vendor lock. DCMA performs the role of administration of the contract deliveries, payment, quality, safety, and some technical support. The services usually retain administration of major engineering and technical changes during post-award, such as managing engineering change proposals (ECP) and systems engineering functions. Therefore, DCMA may have limited insight into requirements changes that impact the production floor.

The Program Office should engage with DCMA to conduct a comprehensive review of production and quality data for commonality in supplier parts and production processes. This review could include analysis of production systems approvals, investment in plant equipment and production technology, and planned expansion or collapse of production capabilities that could cause price increases if the vendor goes unchallenged.

The Program Office should engage DCAA as a technical auditing arm. The FAR requires an audit by DCAA for major production acquisitions. DCAA can provide more than rate verification for direct and indirect costs, to include an analysis of systems engineering and technical assumptions. DCAA audits can be invaluable to verify or validate a vendor's VECP or ECP proposal, and compliment the Program Office engineering staff.

Manage Subcontractor, Supplier, and Make-or-Buy Decisions—The Federal Acquisition Regulation (FAR) requires Government approval of subcontracting actions. On many large systems contracts this approval is pro forma, signifying that the Government has faith that the vendor has selected the right teaming partners and supply chain vendors to bring supplies and services to the program cost effectively. Often the subcontracts are negotiated as sole-source vehicles because of an established relationship between the prime vendor and a particular subcontractor. However, after down-select from competitive development phase, the losing vendor may have a suite of subcontractors and suppliers with capability that might be available to the Program Office because they are not under contract to winning vendor. This creates a pool of viable options at the subcontractor level for production.

If the vendor's normal business practice is to perform most of its work in house, subcontracting may not a large factor in production. The Program Office may be rewarding the vendor as the prime (with higher profit) for "making" more of the lower tier parts (vs. competitively "buying" them), a disincentive to efficiency. The Program Office might benefit from further use of subcontractors under competitive environments.



- Determine opportunities for competitive subsystems or components.* Minimizing the impact of vendor lock can include identifying the components of the system that offer the greatest potential for cost reduction if they were competed instead of sole source subcontractor procurement.

The Program Office should have the prime vendor to provide a full market research data in accordance with FAR Part 10 to leverage maximum access to other suppliers.

The Program Office could consider small business subcontracting and leveraging Small Business Innovation Research (SBIR) to introduce new players in the program.

The Program Office should utilize contract clauses such as the Value Engineering Change Proposal (VECP) or award fee incentive provisions to encourage the contractor to submit proposals for efficiencies with their suppliers.
- Scrutinize component make-or-buy decisions by the prime vendor.* The Program Office could pursue subcontractor sources if the prime vendor's costs to produce an item appear too high. For example, the other competing development vendor may have a key component that had been subcontracted, which indicates the existence of a supplier base for this component.

The Program Office should require the prime vendor to develop an analysis of alternatives (AoA) with a minimum of three alternatives: make, buy, or hybrid buy with multiple suppliers.

The Program Office should require the prime vendor to develop a basis of estimate (BOE) that supports the technical approach to make or buy. The prime vendor should substantiate the BOE with costs and plans for efficiencies in production.
- Analyze requirements that drive variations in supplier products and price.* The Program Office may identify components or subsystems across the production contract that could be redesigned to accept commercial variants. This would serve as a mechanism for including alternative sources of supply for system upgrades at a later date. This would create incentives for the prime vendor to perform effectively, knowing that the customers themselves are continually reviewing requirements for cost drivers.

The Program Office should engage with supply chain vendors to identify efficiencies in production lines. Small businesses have complained that large prime vendors drive supplier prices up because of unique specifications from a broad customer base. This set of suppliers offer a promising source of price efficiencies.

The Program Office should engage DCMA to explore supply chain efficiencies. DCMA has a strong relationship with the suppliers and service providers within the Prime Vendor's team. DCMA is in a position to approve delivery and quality inspection of supplier parts. Therefore, they have data on defects, supply chain problems that can lead to cost increases in production, or potential efficiencies.



Establish a Collaboration Forum—No one military service or private organization has a monopoly on good ideas. A vendor lock situation creates a unique opportunity for multiple military customers to recognize the implications and take steps to avoid the potential drawbacks associated with having a sole-source supplier for their program or technology. Establishing a collaboration forum could aid in identifying ways to improve vendor performance and lower costs in a vendor-locked environment. The military services have convened similar joint forums for other technologies in the past; for example, during the 1990s the Air Force and Navy formed a Joint Missile Board to reduce costs for production and operations of the Navy's Joint Air-to-Air Missile systems. According to statute and the DoD's acquisition policy, major defense acquisition programs are required to conduct annual configuration steering boards to review proposed changes to the program's requirements or significant technical configuration changes that may impact cost and schedule performance.¹⁹ According to a recent GAO report,²⁰ 37 current major weapons programs have conducted such a review. The Vendor Lock Collaboration Forum could compliment the mandated configuration steering boards and mitigate or avoid vendor lock.

The Program Office should consider establishing a forum that includes representatives from the other U.S. military customers, the winning vendor, and other members of the industry team, academia, and Government administrative and quality offices to work through issues in a collaborative environment.

Conclusion

Avoiding and breaking vendor lock is consistent with ensuring affordability in military systems, as directed by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]) memorandum of September 14, 2010, Better Buying Power (BBP). The following suggested actions align with BBP tenets to build affordability into military systems acquisitions:

- Since intellectual property (IP) is a major driver to vendor lock, the Program Office should analyze the true ownership and value of IP within the military terminal technology. Appendix 10 OSD Open Systems Architecture Contract Guidebook provides strategic-level information on breaking and preventing vendor lock. Several areas from the Guidebook could be applied to the vendor lock acquisition environment.
- The Program Office should consider continuous competition strategies and methods to be applied from development through production in order to maintain multiple sources throughout the acquisition life cycle. These strategies can include dual sourcing in production, leader-follower contracts, low-level production quantities, and targeted technologies development with a second vendor.
- The Program Office should consider looking across the vendor's complete production lines for cost reductions, since economies should be available by

¹⁹ Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, § 814 (2008).

²⁰ GAO. March 2014, Report GAO 14-340SP, Defense Acquisitions—Assessments of Selected Weapon Programs, Washington, DC; p. 45.



having one vendor producing all military technology. This review should an independent analysis to identify areas of redundancy and product variations that drive costs. This review should explore opportunities for shared technology for both military and commercial variants

- The Program Office should collaborate closely with DCMA to review production testing and quality control specifications to mitigate cost drivers in redesign and product changes. The Program Office should draw on data produced by the DoD Office of Performance Assessments and Root Cause Analyses (PARCA)—the central office for performance assessment, root cause analysis, and earned value management of major Defense authorizations. PARCA possesses data that can support further review of cost drivers and programmatic issues, especially in design and testing.
- The Program Office should look for efficiencies in the supply chain and supplier costs. Many times, suppliers know where variations in production runs that could be standardized with minor adjustments to requirements without sacrificing mission.
- The Program Office should leverage the ability to renegotiate prices in post-award in order to continually examine prices and price creep under a firm-fixed-price contract. The Program Office should consider the following areas: IR&D cost sharing, IP ownership, technical data reuse, component and supplier parts competitions, quantity discounts, or commonality of supplier parts. Utilize contract clauses, such as Value Engineering Change Proposals (VECP), award fee incentive provisions and post-award audit results to potentially renegotiate prices.
- The Program Office should consider enhancing collaboration across the Military Services by establishment of a Joint Cross-Service Collaboration Forum to focus on ways to mitigate and avoid vendor lock.

Reference List

- Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, § 814 (2008).
- GAO. (2011, March 9). *Trends in Nunn-McCurdy cost breaches for major defense acquisition programs* (Report No. GAO 11-295R). Washington DC
- GAO. (2011, May). *Defense Acquisition: DoD Should Clarify Requirements for Assessing and Documenting Technical-Data Needs* (Report GAO 11-469). Washington, DC.
- GAO. (2012, March). *Defense Acquisitions Assessment of Selected Weapon Programs* (Report GAO 12-400SP). Washington, DC.
- GAO. (2014, March). *Defense Acquisitions—Assessments of Selected Weapon Programs* (Report GAO 14-340SP). Washington, DC.
- Government Business Council and Booz Allen Hamilton. (2014, March). *Bridging the Disconnect*, Insight Report. Government Executive Media Group, Washington, DC.
- Hofbauer, J. et al. (2011). *Cost and Time Overruns for Major Defense Acquisition Programs*. Center for Strategic and International Studies (CSIS), Washington, DC. Meyers, Dominique.
- Linux Foundation; open source tools; San Francisco, CA.
- Key Open Subsystems Tool, Naval Air Systems Command. Patuxent River, MD; Public Release SPR-09-674, 5 Aug 2009.



- Office of the Secretary of Defense. (2013). *Open Systems Architecture Contract Guidebook for Program Managers*, Ver 1.1. Appendix 10, Breaking Vendor Lock. Washington, DC.
- Office of the Staff Judge Advocate, Space and Missile Systems Center. (2014, March). *Acquiring and Enforcing the Government's Rights in Technical Data and Computer Software Under Department of Defense Contracts: A Practical Handbook for Acquisition Professions*.
- Office of the Under Secretary of Defense, Acquisition, Technology and Logistics. (2013). *Performance of the Defense Acquisition System, 2013 Annual Report*. Washington, DC.
- RAND Corporation. (2001). *Assessing Competitive Strategies for the Joint Strike Fighter—Opportunities and Options*. Santa Monica, CA.
- Taft News and Events. (2011, October 18). DoD Issues Final Rule on Ownership of Technical Data Rights Where Commercial Item is Developed Exclusively at Private Expense.
- Under Secretary of Defense for Acquisition, Technology and Logistics (USD[AT&L]). (2010, September 14). Better Buying Power (BBP) [Memorandum]. Washington, DC: Author.





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